A METHOD OF ALTERNATING THE STACKING DIRECTION OF OBJECTS THAT ARE FLAT AND FLEXIBLE, MEANS FOR IMPLEMENTING THE METHOD, AND AN INSTALLATION FOR MAKING UP BATCHES AND FITTED WITH SUCH MEANS

The invention relates to a method of alternating the stacking direction of flat and flexible objects which are to be stacked in order to make up a batch ready for packaging.

The invention also relates to means for implementing the method and to installations for making up batches and fitted with such means.

The invention relates particularly but not exclusively to a method used in an industrial installation for making up batches of flat objects and operating at high speed.

Although not limiting, the term "installation operating at high speed" is used to mean an installation which operates at a throughput of treated objects in excess of several hundred objects per minute.

By way of example, the flat objects can be products that are flexible and deformable in the thickness direction, such as hygiene products made of absorbent material.

In such batches, the flat objects are placed substantially parallel to one another, one against another, in particular so as to be ready for placing in a box or bag that encloses a volume that is substantially in the form of a rectangular parallelepiped, and that is as small as possible in size.

When such hygiene products are folded over prior to being packaged, whether they are folded in two or in three, they present extra thickness, at least in the vicinity of a fold.

The extra thicknesses of the various items in a batch accumulate, thereby giving rise to batches being formed having two opposite faces that lie in intersecting planes.

In other words, the made-up batches are wedge-shaped.

Such a wedge shape is detrimental to the packing of such batches in a small volume.

The extra thickness phenomenon becomes worse when, firstly the products have a profile in the thickness direction so as to present relatively thin edges, and secondly they incorporate so-called "superabsorbent" substances which are concentrated in a zone containing a fold.

An effective solution to this problem of building up batches that are wedge-shaped consists in alternating the stacking direction of the items.

However, technically speaking, that solution is difficult to implement.

The above-mentioned hygiene products are manufactured at throughputs greater than several hundred items per minute, so the speed of which they leave the machine manufacturing them is therefore high.

This speed is so high that in order to make up batches having a determined number of items, it is necessary for the items initially to be braked and received on a device within which they are disposed substantially parallel to one another so that batches can subsequently be extracted therefrom.

The invention relates specifically to a method suitable for alternating the items without repercussions on their method of manufacture.

The invention also relates to installations for making up batches and fitted with such means.

A result that the invention seeks to achieve is a method of alternating items that can be implemented without repercussions on the operation of an existing installation, and without requiring substantial modification of that installation.

To this end, the invention provides a method of alternating the stacking direction of flexible flat

objects which are to be stacked in order to constitute batches ready for packaging, the method being characterized in particular in that in order to make up sets of items suitable for constituting batches of items in which at least two items are placed head-to-tail, the following operations are performed during travel of the compartments past the loading station, downstream from said station:

· at a determined "extraction" site, at least one item is extracted from a compartment in which it has been placed; and

· the orientation of each extracted item is changed so that it can be placed in a determined empty compartment head-to-tail relative to its initial insertion direction in the loading station; and

· at a determined "reinsertion" station said reoriented item is inserted into an empty compartment.

The invention will be well understood on reading the following description given by way of non-limiting example and made with reference to the accompanying drawings, in which:

· Figure 1 is a plan view of an installation implementing a device for making up batches each comprising a determined number of items coming successively from a production machine;

· Figures 2 and 3 are on a larger scale and show a detail of how means are embodied for implementing the method; and

· Figure 4 is a section view on AA of Figure 2.

With reference to the drawings, there can be seen an installation 1 for making up batches 2 each comprising a determined number of items 3 coming in succession from a production machine 4.

This installation 1 for making up batches 2 serves to receive the items 3 as they are produced and to place them side by side and substantially parallel to one another so that they can make up said batches 2.

To this end, the installation 1 comprises a plurality of compartments 1A supported by an element 1B for moving them between at least two stations 1C and 1D comprising firstly a loading station 1C in which said compartments 1A are loaded in succession with items 3 delivered in a determined insertion direction S1, and secondly a station 1D for unloading at least one set E of items ready to make up a batch 2.

By way of example, the installation 1 comprises an endless element 1B which circulates over deflector members and which carries partitions 1E disposed in such a manner as to constitute compartments 1A suitable for receiving the items.

Characteristically, in order to make up sets E of items suitable for constituting batches 2 of items 3 in which at least two items 3 are disposed head-to-tail, the following operations are performed while the compartments 1A travel past the loading station 1C, downstream from this station 1C:

· at a determined "extraction" site A, at least one item 3 is extracted from a compartment 1A in which it has been placed; and

· the orientation of each extracted item 3 is changed so that it can be placed in a determined empty compartment 1A head-to-tail relative to its initial insertion direction S1 in the loading station 1C; and

· at a determined "reinsertion" site B, said reoriented item 3 is inserted into an empty compartment 1A.

It is in this way that the method of the invention makes it possible to alternate the stacking direction of at least some of the items.

In Figure 1, the direction in which some of the items are oriented is represented by means of arrows referenced S1 and S2.

The arrows S1 and S2 are placed beside the items to show their relative orientation, i.e. how they are oriented relative to one another.

Orientation direction S1 corresponds to the insertion direction, but that is not limiting.

The direction S2 of an item referenced R is opposite to the direction S1 of an item referenced 3.

The item referenced 3R is an item that has been turned round, while the item 3 is an item whose orientation has not been changed.

The items referenced 3R and 3 are therefore disposed head-to-tail.

Also in characteristic manner, the items 3 are extracted and reinserted in succession, i.e. one by one.

Specifically, each item 3 is reinserted into a compartment 1A which, relative to the travel direction, is situated downstream from the compartment 1A from which the item was extracted.

For example, as shown, every other item 3 is extracted and then reinserted.

Also specifically, to turn around each item 3 extracted from a compartment 1A, it is caused to follow a curved path T1 lying in a plane P1 approximately parallel to a plane P2 containing the path T2 around which the compartments 1A travel between the extraction site A and the site B for reinsertion into a compartment 1A.

Preferably, a device 1R comprises means M1, M2, and M3 for implementing the method, said means consisting in:

· extraction means M1 for extracting at least one item 3 from compartments 1A at a determined "extraction site" A; and

· orientation-changing means M2 for changing the orientation of each extracted item 3 so that it can be placed in a determined compartment 1A head-to-tail relative to its initial insertion direction; and

· insertion means M3 for inserting said reoriented item 3 in an empty compartment 1A at a likewise determined "reinsertion" site B; together with

· control means M4 for controlling the operation of the above-specified means M1, M2, and M3 synchronously with the device 1 for making up batches 2.

The extraction means M1 consists in means M1 for extracting items 3 one by one.

The extraction means M1 comprises a drive-and-guide element 11 for driving and guiding at least one extractor stop 12 over an "accompanying" path, i.e. a path T3 which intersects the path T2 of the compartments 1A in a plane onto which the paths are projected, said accompanying path being oriented in such a manner that each extractor stop 12 that comes into contact with an item 3 pushes it out from its compartment 1A at the extraction site A and continues to do so at least until said item 3 has been engaged in the orientation-changing means M2.

The orientation-changing means M2 for changing the orientation of each extracted item 3, i.e. the means M2 for turning end-for-end each item 3 extracted from a compartment 1A, consists in means M2 for guiding the item 3 over a curved path T1 situated in a plane that is approximately parallel to the plane containing the travel path T2 of the compartments 1A between the extraction site A and the site B for reinsertion into a compartment 1A.

The means M2 is disposed to receive each item 3 extracted from a compartment 1A by the means M1 provided for this purpose.

The insertion means M3 for inserting each item 3 one by one into an empty compartment 1A is constituted by means M3 for moving each item 3 along a path T4 which intersects the path followed by the compartments 1A in a plane onto which the paths are projected, and which is oriented in such a manner that each item 3 is pushed into

a compartment 1A, and is pushed at least until said item 3 has been fully engaged in said compartment 1A.

The means M4 for controlling the operation of the above-mentioned means M1, M2, and M3 so that they operate synchronously relies on conventional elements for managing the operation of electric motor means, and it is not described in greater detail.

The orientation-changing means M2 for changing the orientation of each item 3 as extracted from a compartment 1A essentially comprises a set of two belts C1 and C2 which, driven by motor means (not shown) travel over deflector members R1 to R9 and present two adjacent strands B1 and B2, which strands B1 and B2 define means both for gripping an item 3 across its thickness and for moving the item 3 over a substantially curved path T1, said adjacent strands B1 and B2 for this purpose:

- firstly each extending between the site A for extracting an item 3 from a compartment 1A and site B for reinserting said item 3 into a compartment 1A; and
- secondly being situated in a plane that is approximately parallel to a plane containing the travel path T2 of the compartments 1A, between said extraction and reinsertion sites A and B.

Advantageously, the orientation-changing means M2 includes a deflector member R1 of diameter D such that a major fraction of its circumference defines a curved path T1 that is tangentially connected to the paths T3 and T4 for extracting and reinserting the items 3.

The orientation-changing means M2 has deflector members R2 and R3 which are disposed so as to deflect and space apart the belts C1 and C2 approximately into a plane substantially tangential to the compartments, thereby constituting at least part of the insertion means M3 for inserting each item 3 one by one into an empty compartment 1A.

In the various figures, unreferenced arrows symbolize the directions in which the main members rotate or move.